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(54) CONDUCTIVE RESIN COMPOSITION, SEPARATOR FOR FUEL CELL AND SEALING MATERIAL

(57) Abstract:

PROBLEM TO BE SOLVED: To obtain a conductive resin composition capable of exhibiting excellent moldability, conductivity, gas seal performance and strength, usable for separator for fuel cell, sealing material or the like, by utilizing a liquid crystal polymer as composite resin with a conductive filler.

SOLUTION: This composition includes (A) the liquid crystal polymer such as liquid crystal polyester or the like, (B) the conductive filler such as graphite (for example expanded graphite, granular graphite), Ketjenblack, acetylene black, furnace carbon black, thermal carbon black or the like, and if necessary, (C) carbon fiber or glass fiber. This composition preferably, includes 50 to 900 pts.wt, more preferably 100 to 600 pts.wt. of the component B per 100 pts.wt. of the component A.

FULL CONTENTS

[Claim(s)]

[Claim 1] The conductive resin constituent characterized by including a liquid crystal polymer and a conductive filler.

[Claim 2] The conductive resin constituent according to claim 1 characterized by said conductive fillers being one or more fillers chosen from the group which consists of a graphite, KETCHIEN black, acetylene black, furnace carbon black, and thermal carbon black.

[Claim 3] The conductive resin constituent according to claim 2 characterized by said graphite being expanded graphite or a granular graphite.

[Claim 4] A conductive resin constituent given in any 1 term of Claim 1 -3 characterized by said liquid crystal polymer being liquid crystal polyester.

[Claim 5] A conductive resin constituent given in any 1 term of Claim 1 -4 to which the loadings of said conductive filler are characterized by being the 50 - 900 weight section to said liquid crystal polymer 100 weight section.

[Claim 6] The conductive resin constituent according to claim 5 with which the loadings of said conductive filler are characterized by being the 100 - 600 weight section to said liquid crystal polymer 100 weight section.

[Claim 7] A conductive resin constituent given in any 1 term of Claim 1 -6 characterized by containing a carbon fiber and/or a glass fiber further.

[Claim 8] The separator for fuel cells characterized by changing from the conductive resin constituent of a description to any 1 term of Claim 1 -7.

[Claim 9] The sealing material characterized by changing from the conductive resin constituent of a description to any 1 term of Claim 2 -7.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the separator for fuel cells and sealing material which consist of a conductive resin constituent and said conductive resin constituent.

[0002]

[Description of the Prior Art] The need about the fuel cell which carries out direct conversion of the chemical energy which a fuel has to electric energy is increasing in recent years. Generally the fuel cell has composition which laminated many unit cells by which the electrode plate has been arranged on both sides of the matrix containing an electrolyte, and the separator has been arranged further on the outside. Usually, since a fuel is supplied to one side of a separator and a gas oxidizer etc. is supplied to another field, a separator needs to excel in gas impermeability so that both may not mix. Moreover, since a unit cell is

laminated and used, for a separator to have high conductivity and to excel also in reinforcement is demanded.

[0003] Conventionally, the mold goods obtained by carrying out press forming of the graphite sheet as a separator for fuel cells, the resin impregnation material which infiltrated resin into the carbon sintered compact, the glassy carbon obtained by calcinating thermosetting resin by an inert atmosphere, the resin mold goods which carried out mixed postforming of the end of carbon powder and the resin, etc. are used. For example, the separator which grows into JP,S60-37670,A from thermosetting resin and carbon paper, such as phenol resin, is in; JP,H1-311570,A, The separator which blends expanded graphite and carbon black with thermosetting resin, such as phenol resin and furan resin, is indicated, respectively.

[0004] Fillers, such as a graphite and carbon black, are used also as a raw material for sealing materials again. For example, if polymers, such as rubber, are filled up with carbon black, whenever [solvent swell / of a polymer] can be improved and properties, such as reinforcement and abrasion resistance, can be attached. Graphites are concordance **** to the outstanding sliding nature and flange surface, and a simple substance, or are used as sealing materials, such as packing and a vortex gasket, in the form of composite with a polymer.

[0005]

[Problem(s) to be Solved by the Invention] However, in the separator for fuel cells, in resin impregnation material, cutting is needed and time and effort and cost start manufacture. If glassy carbon is used, the fabricating operation to a product configuration will become possible before baking, but a problem produces the dimension contraction at the time of baking etc. in respect of dimensional stability. Although resin mold goods are easy to fabricate, the fault inferior to conductivity is on account of the electric insulation of resin. If abundant restoration of the conductive filler is carried out that this point should be improved, shaping will become difficult or impossible. Moreover, also in a sealing material, abundant restoration of a filler brings about various advantages. For example, abundant restoration of the carbon black can be carried out into rubber, and gas permeation-proof nature can be improved. In especially a graphite system sealing material, when obtaining high sliding nature and surface concordance nature, it is desirable to raise a graphite compounding rate as much as possible. Also in these sealing materials, problems, such as aggravation of a moldability and strength reduction, arise by abundant restoration of a filler.

[0006] This invention is made in view of such a situation, and manufacture and shaping are easy and it aims at offering the resin composition object which is excellent in reinforcement, conductivity, and sealing nature, the cell for fuels which consists of it, and a sealing material.

[0007]

[Means for Solving the Problem] This invention persons are easy to fabricate by using a liquid crystal polymer, as a result of examining the resin used for composite with a

conductive filler that the above-mentioned object should be attained. For example, when it applied to the separator for fuel cells, or a sealing material, it found out that the composite which is excellent with sufficient balance of required conductivity, gas-seal nature, and reinforcement was obtained. That is, this invention relates to the separator for fuel cells and sealing material which consist of a conductive resin constituent characterized by including a liquid crystal polymer and a conductive filler, and said conductive resin constituent.

[0008]

[Embodiment of the Invention] This invention is hereafter explained to a detail. In this invention, it is important requirements to use a liquid crystal polymer as a resinous principle. As the example which carries out a postscript also shows, even if it uses other polymers as a resinous principle, the composite which has physical properties which this invention makes the object, such as high conductivity, high intensity, and shaping ease, cannot be obtained. On the other hand, the constituent which is excellent with sufficient balance of physical properties, such as conductivity, gas-seal nature, and reinforcement, can be obtained by using a liquid crystal polymer as a resinous principle according to this invention. And in comparison with the conductive resin constituent which uses thermosetting resin as a resinous principle, even if compared with the conductive resin constituent which uses thermoplastics as a resinous principle, of course, it becomes easy manufacture and fabricating the conductive resin constituent of this invention. Moreover, the resinous principle by which the volume resistivity of the liquid crystal polymer itself is used for the conventional conductive resin constituent In spite of being high compared with (for example, the polyamide mentioned as the comparative example, polybutylene terephthalate, and polyester system thermoplasticity Hellas Maher), the conductivity which excelled complex with the conventional resinous principle in complex with a conductive filler comes to be shown. These are not expected at all.

[0009] This liquid crystal polymer (LCP) is well-known in itself. LCP is a general term for the polymer which shows a liquid crystal state at the time of fusion, and it cannot draw with one structure expression. Also in this invention, the word called LCP includes all the polymers that show liquid crystallinity. Two or more LCP can also be used together. LCP is solidified carrying out orientation in that direction and maintaining this orientation at the time of cooling solidification, when the molecular assembly arranged at the time of fusion was formed and external force, such as shearing and extension, was received. Therefore, compared with other polymers, a high fluidity, a low coefficient of linear expansion, good dimensional accuracy, high intensity, thermal resistance, fire retardancy, chemical resistance, etc. are shown. in addition -- if there is crystallinity when it solidifies -- Crystallinity LCP -- it will be called amorphia LCP if there is nothing.

[0010] Moreover, although LCP is easily available from a commercial scene, Marketing LCP is usually classified into Type IIa whose heat deflection temperature is the type I of 300 degrees C or more and 240-300 degrees C, Type IIb which is 200-240 degrees C, and Type III below 200 degrees C based on the heat deflection temperature. Any LCP of a type

can be used in this invention. For example, when LCP of Types I and IIa is needed for shaping at low temperature, it uses LCP of Type III or IIb for the heat-resistant application demanded. Commercial LCP is a copolymer which consists of two or more sorts of monomers, and there are some into which others and amide combination and imide combination of a thing (liquid crystal polyester), carbonate combination, a urethane bond, etc. which consist only of an ester bond were introduced in the bond form. Although all of these LCP can be used in this invention, it is desirable to use liquid crystal polyester especially.

[0011] Liquid crystal polyester is also well-known and Xydar of Nippon Oil Chemistry, Various products, such as Vectra of Polyplastics, Inc., a nova curate of Mitsubishi Engineering plastics, a rod run of Unitika, Ltd., and SUMIKASU Per of Sumitomo Chemical Co., Ltd., are marketed. Liquid crystal polyester Usually, a - O-phi-C (=O)-component (here, phi shows the Para phenylene group) and;-O-phi-O -, - Upright component;-O-m-phi-O [, such as O-phi-phi-O -, -C(=O)-phi-C (=O) -, and -C(=O)-phi-phi-C (=O) -,] -, - C(=O)-m-phi-C (=O) -, -C(=O)-m-phi-m-phi-C (=O) -, - O-m-phi-C (=O) -, - O-phi-O-phi-O -, - O-phi-C (=O)-phi-O -, - O-phi-C (CH3) 2-phi-O -, - O-m-phi-C (CH3) 2-phi-O -, - O-m-phi-C (=O)-phi-C (=O) -, -O-Np-O-, -O-Np-C(=O)-, -C(=O)-Np-C(=O)- (here), etc. Bent m-phi shows a meta-phenylene group and Np indicates a naphthyl group to be, It has structure to which copolymerization of the flexible chains, such as a Crankshaft component, a component ~~which gave substituents, such as an alkyl group and a phenyl group, to these or;-O-R-O-,~~ and -C(=O)-phi-O-R-O-phi-C (=O) - (here, R shows an alkylene group), was carried out. High-heat-resistance liquid crystal polyester of Type I mainly consists of a - O-phi-C (=O)-component and an upright component, and Type IIa contains the Crankshaft component which has a naphthyl group in many cases. For example, an aliphatic series radical is generally included, liquid crystal polyester of structure like [- O-phi-C (=O)-] n[-C(=O)-phi-C (=O)-O-R-O-] m is classified into Type IIbIII, and its molding temperature is low and it is excellent in flexibility. Any liquid crystal polyester of the type described above in this invention can be used. There is no limit in particular in the molecular structure, thermal resistance, heat deflection temperature, molecular weight, melt viscosity, etc. However, for the application of which thermal resistance is required, it is desirable to use Type IIb or III and liquid crystal polyester containing especially an aliphatic series radical for the application as which liquid crystal polyester of Type I or IIa is required of flexibility and a fluidity. When a fluidity is especially required, the melt viscosity in the temperature of 300 degrees C uses 103poise or less of liquid crystal polyester [103poise or less of] of 102poise or less especially by 102/of shear rate second in 103/of shear rate second preferably at 103/of shear rate second. By this, also when abundant restoration of the conductive filler is carried out, a good moldability and reinforcement can be held.

[0012] A conductive filler can also use various well-known things. For example, the metallic-oxide; conductivity covering form conductivity filler of the powder of metals, such as silver, nickel, copper, aluminum, iron, and stainless steel, a flake, fiber;SnO2, ZnO, In 2O3, and

TiO2; although the powder of a carbon system, fiber, a flake, etc. are mentioned, it is not limited to these. It is also possible to use together two or more conductive fillers.

[0013] However, in this invention, it is desirable to use the powder of a carbon system or a flake, for example, carbon black, a graphite, etc. as a conductive filler. By using these carbon system filler, also when the corrosion resistance of a conductive resin constituent is raised and it is used as a fuel cell etc., side reaction can be prevented. One or more fillers more preferably chosen from the group which consists of a graphite, KETCHIEN black, acetylene black, furnace carbon black, and thermal carbon black are used. The constituent obtained is more excellent in conductivity with this. Among these, KETCHIEN black and acetylene black are developed as a conductive filler, and are obtained by the pyrolysis of incomplete combustion, such as natural gas, and acetylene, respectively. Furnace carbon black is a filler obtained by the incomplete combustion of a hydrocarbon oil or natural gas, and is classified into SAF, ISAF, IISAF, HAF, FF, FEF, MAF, GPF, SRF, CF, etc. according to particle size. Thermal carbon black is the carbon of the large particle diameter obtained by the pyrolysis of natural gas, and FT carbon, MT carbon, etc. are mentioned as an example.

[0014] Although it is independent about any of these carbon system filler in this invention or two or more sorts may be mixed and used, a graphite is especially used for a graphite or KETCHIEN black preferably. There is no limit in particular in the class of this graphite, and graphites of any forms, such as a granular graphite and scale-like graphite, expanded graphite, and a colloidal graphite, can be used. The activity of the intercalated graphite which intercalated fluoride graphite or various metal atoms, the halogen atom, the halogenated compound, etc. is also possible. Expanded graphite is what carried out extended processing of between the layers of the graphite crystal structure here, and conductivity and especially lubricity are good. Also in the above-mentioned graphite, expanded graphite and especially a granular graphite are desirable.

[0015] The loadings of a conductive filler have the desirable 50 - 900 weight section to the liquid crystal polymer 100 weight section. If the loadings of a conductive filler are less than 50 weight sections, satisfactory conductivity will not be acquired, but if the 900 weight sections are exceeded, a problem will be produced in respect of a moldability or reinforcement. When these points are taken into consideration, as for especially the loadings of a conductive filler, it is desirable the 100 - 600 weight section and especially to consider it as the 200 - 500 weight section.

[0016] The conductive resin constituent of this invention can also strengthen the mechanical strength of the mold goods (for example, the separator for fuel cells and a sealing material) by blending fiber further. For example, the 1 - 100 weight section, the reinforcement of the mold goods which will be obtained if 10-50 weight section grade combination is carried out especially, especially shock resistance are [a carbon fiber and/or a glass fiber] improvable to the liquid crystal polymer 100 weight section. There is no limit in particular in the class of a carbon fiber and glass fiber, and various well-known fiber can

be used. Otherwise, cotton, wool, silk, hemp, a nylon fiber, an aramid fiber, Vinylon (polyvinyl alcohol) fiber, Polyester fiber, a rayon fiber, an acetate fiber, phenol formaldehyde fiber, It is also possible to use fiber, such as polyphenylene sulfide fiber, an acrylic fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, a polyurethane fiber, and tetra-FURORO ethylene fiber. However, in this invention, it is desirable to use a carbon fiber especially a PAN system carbon fiber, and a pitch based carbon fiber. Reinforcement can be improved by this, without spoiling most conductivity of mold goods. Although there is no limit in particular also in the configuration of fiber, die length uses especially preferably fiber within the limits which are about 0.1-20mm about 0.01-100mm. When shaping is difficult when a fiber length exceeds 100mm, and it becomes difficult to make the surface smooth and is less than 0.01mm, it becomes impossible to expect a reinforcing effect.

[0017] Otherwise in the conductive resin constituent of this invention, other polymers as an arbitrary component, For example, PET, PBT, thermoplastic elastomer polyester, low-molecular-weight polyester, A filler, for example, a silica, besides;, such as a polyamide, nitrile rubber, and acrylic rubber, Fillers, such as a calcium carbonate, a barium sulfate, and a viscosity mineral, a pigment, etc.; plasticizers, such as a dispersant, an antioxidant, a coupling agent, a compatibilizer, a flame retarder, a surface lubricating agent, a fatty acid, and the ester, phthalic ester, plastic powder, processing aid, etc. can also be blended further.

[0018] The conductive resin constituent of this invention can be manufactured by the method of various common use. Generally, heat melting of LCP is carried out, it kneads, and a conductive filler, fiber, etc. are added. Typically, LCP is fused with a kneader, a Banbury mixer, an extruder, a heating roller, etc., and a conductive filler, fiber, etc. are added under kneading there.

[0019] Like the above, the conductive resin constituent of this invention constituted is easy to fabricate, and its conductivity is high, and it is excellent in reinforcement and gas impermeability. So, it is the optimal as an ingredient of the separator for fuel cells. Moreover, among the conductive resin constituents of this invention, the thing using the carbon system filler, especially the graphite as a conductive filler has good sliding nature and surface concordance nature, when excelled in gas impermeability etc. So, it is useful also as a sealing material, especially packing.

[0020] A molding method in particular is not restricted but can fabricate injection molding, extrusion molding, transfer molding, blow molding, press forming, injection press forming, extrusion injection molding, etc. in the field of thermoplastics to various kinds of configurations with general-purpose various molding methods. Moreover, you may combine two or more these molding methods. For example, you may carry out the Motoshige form of the sheet like object which could also be made to carry out melt adhesion of the mold goods obtained by injection molding or extrusion molding, and was obtained by extrusion molding or press forming to the article of the shape of complicated toothing by press forming etc. If it is a person skilled in the art, it will be possible to select a desirable molding

method and a desirable process condition according to an application and a configuration. Since it has the advantage said that melt molding is possible, it is useful especially as ingredients, such as a thick material along which a complicated-shaped article and heat cannot pass easily. Moreover, recycling of a cast and reuse of a weld flash part etc. are also possible. Hereafter, although an example explains this invention in more detail, this invention is not limited to the following examples.

[0021]

[Example] [An example 1-6, a comparative example 1-5]

- The constituent with expanded graphite was created using resin of preparation various kinds of a sample. The description of the used resin is shown below.

LCP-1 : Liquid crystal polyester of Type III, 1x1017ohms of volume resistivity and cm, The heat deflection temperature of 120 degrees C, specific gravity 1.38LCP-2 : Liquid crystal polyester of Type III, Volume resistivity 6x1016 ohm-cm, the heat deflection temperature of 170 degrees C, specific gravity 1.41LCP-3 : Liquid crystal polyester of Type IIb, Volume resistivity 1x1017 ohm-cm, the heat deflection temperature of 210 degrees C, specific gravity 1.38PA-1 : A polyamide 6, volume resistivity 1x1015 ohm-cm, Specific gravity 1.14PA-2 : A polyamide 66, volume resistivity 1x1014 ohm-cm, Specific gravity 1.15PA-3 : A polyamide 12, volume resistivity 1x1016 ohm-cm, Specific gravity 1.06PBT : Polybutylene terephthalate, 1x1016ohms of volume resistivity and cm, Heat deflection temperature of 60 degrees C, specific gravity 1.31TPEE: Thermoplastic elastomer polyester, volume resistivity 1.8x1012 ohm-cm, specific gravity 1.15, in addition the above-mentioned volume resistivity are what was measured according to ASTM D257. It is. Heat deflection temperature is the value measured by load 18.6 kgf/cm2 according to ASTM D648.

[0022] And expanded graphite of the specified quantity was added, kneading each above-mentioned resin at 30rpm with the temperature more than melting temperature among the mill equipped with heating apparatus, as shown in a table 1. After all the kneading during 15 minutes, kneaded material was taken out, specified quantity restoration was carried out into the mold, it fabricated on the 100x100x2mm sheet with a heat press, and the sample was obtained. When manufacturing a sample, the quality of the flow nature within the difficulty of kneading and the mold at the time of a press was judged simultaneously. Ejection, bending strength, and volume resistivity were measured for the sample blank test piece according to ASTM D790 and JISK7194, respectively. The examination about gas transmittance was also done depending on the sample. Assessment of gas transmittance was performed by measuring the transmission quantity of N2 gas which passes the sample of 2mm thickness under the application of pressure of 1 kgf/cm2. A unit is a part for ml/. The difficulty at the time of manufacturing each sample (quality of the flow nature within the difficulty of kneading and the mold at the time of a press) and the physical properties of a sample are shown in a table 1.

[0023]

[Table 1]

表 1：各サンプルの製造容易性・物性

		実施例1	実施例2	実施例3	比較例1	比較例2	比較例3	比較例4	比較例5	実施例4	実施例5	実施例6
配合	LCP-1	25.0	—	—	—	—	—	—	—	30.0	40.0	12.5
	LCP-2	—	25.0	—	—	—	—	—	—	—	—	—
	LCP-3	—	—	25.0	—	—	—	—	—	—	—	—
	PA-1	—	—	—	25.0	—	—	—	—	—	—	—
	PA-2	—	—	—	—	25.0	—	—	—	—	—	—
	PA-3	—	—	—	—	—	25.0	—	—	—	—	—
	PET	—	—	—	—	—	—	25.0	—	—	—	—
	TPEE	—	—	—	—	—	—	—	25.0	—	—	—
	配強無鉛	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	70.0	60.0	87.5
製造	混練難易	容易	容易	容易	容易	容易	容易	やや難	やや難	容易	容易	やや難
	プレス内流れ性	良好	良好	良好	良好	やや悪	悪	悪	やや悪	良好	良好	やや悪
物性	曲げ強さ(kgf/cm²)	232	287	341	187	153	151	134	197	268	371	149
	体積固有抵抗(mΩ cm)	10	8	19	70	80	100	120	47	35	55	2
	気体透過度(ml/分)	0.01	0.01	—	—	—	—	—	—	—	0.00	—

[0024] The sample which uses LCP as a resinous principle according to this invention is easy to knead, those of the flow nature in a mold is good, and shows high intensity and high conductivity. Moreover, gas transmittance is also excellent in sealing nature low (only the value of error intensity has been measured). On the other hand, although the sample which uses a polyamide as a resinous principle is easy to knead and the flow nature in a mold is also good, reinforcement is somewhat inferior and, moreover, volume resistivity has

a high fault (comparative example 1-3). With the sample which uses polybutylene terephthalate and thermoplastic elastomer polyester as a resinous principle, it is inferior to the sample according to this invention also about kneading nature, flow nature, reinforcement, and conductive any (a comparative example 4, 5). Moreover, although the volume resistivity of the raw material LCP resin itself used in the example is higher than the resin (a polyamide, PBT, TPEE) used by the comparative example three sorts, the conductive resin constituent obtained in spite of it has good conductivity.

[0025] [Comparative example 6] Except for having used the polycarbonate (4x1016ohms of volume resistivity and cm, specific gravity 1.20, heat deflection temperature of 135 degrees C) as a resinous principle, Although the same operation as an example 1-6 was tried, when 200 weight sections (about 67% of the whole) intensity addition of the expanded graphite was carried out, it became fine particles-like, and kneaded material overflowed from the kneading machine and it became impossible to kneading continue it.

[0026] [Comparative example 7] Although the same operation as an example 1-6 was tried except having used polystyrene (specific gravity 1.06, heat deflection temperature of 81 degrees C) as a resinous principle, before 200 weight sections intensity also added expanded graphite, it became fine particles-like, and kneaded material overflowed from the kneading machine and it became impossible to kneading continue it.

[0027] [Example 7-17] As shown in a table 2, the constituent with LCP was prepared using various conductive fillers. Here, for the mean fiber length of 0.1-1.0 micrometers and a carbon fiber, as for 0.2mm and a size, the particle size of spherical silver dust of 3mm and a size is [the mean fiber length of 1d and a glass fiber] 2d. And the sheet-like sample was fabricated like the example 1-6. The difficulty nature at the time of manufacturing each sample and the physical properties of a sample are shown in a table 2.

[0028]

[Table 2]

表 2：各サンプルの製造容易性・物性

		実施例7	実施例8	実施例9	実施例10	実施例11	実施例12	実施例13	実施例14	実施例15	実施例16	実施例17
配合	LCP−1	25.0	25.0	25.0	25.0	25.0	25.0	20.0	20.0	20.0	20.0	20.0
	膨張黒鉛	50.0	50.0	50.0	50.0	50.0	50.0	80.0	70.0	50.0	50.0	50.0
	粒状黒鉛	25.0	—	—	—	—	—	—	10.0	30.0	25.0	25.0
	アセチレンブラック	—	25.0	—	—	—	—	—	—	—	—	—
	ケッチェンブラック	—	—	25.0	—	—	—	—	—	—	—	—
	SRFカーボン	—	—	—	25.0	—	—	—	—	—	—	—
	MTカーボン	—	—	—	—	25.0	—	—	—	—	—	—
	球状銀粉	—	—	—	—	—	25.0	—	—	—	—	—
	ピッチ系炭素繊維	—	—	—	—	—	—	—	—	—	5.0	—
	ガラス繊維	—	—	—	—	—	—	—	—	—	—	5.0
製造	混練難易	容易	容易	容易	容易	容易	容易	容易	容易	容易	容易	容易
	プレス内流れ性	良好	やや悪	やや悪	やや悪	やや悪	良好	良好	良好	良好	やや悪	良好
物性	曲げ強さ(kgf/cm²)	252	273	287	347	307	221	176	205	214	272	302
	体積固有抵抗(mΩ cm)	13	15	11	17	20	6	8	7	4	5	8

[0029] even if the conductive resin constituent which uses LCP as a resinous principle according to this invention boils and changes various classes of conductive filler, and loadings, it is easy to fabricate and it is clear that its high reinforcement and conductivity are shown.

[0030]

[Effect of the Invention] By this invention, manufacture and shaping were easy and the resin

composition object which is excellent in reinforcement, conductivity, and sealing nature, the cell for fuels which consists of it, and the sealing material were offered. In view of the ingredient which has these advantages not having been seen conventionally, the effectiveness of this invention is remarkable.